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<b>14. ABSTRACT</b> The objective of this project is to develop and pilot an internet-delivered parent training program for caregivers of children with autism spectrum disorders (ASD). The intervention will be based on an evidence-based curriculum that uses a blend of developmental and behavioral intervention strategies during daily routines and activities. In the first phase of the project (Year 1), the focus is on developing the online parent training program. We have modified an existing evidence-based parent training curriculum to be delivered over the internet in 12, self-administered modules containing the intervention content. In addition, we developed a number of distance learning activities designed to help users master the material. Modifications were made with input from focus groups that we conducted with parents of children with ASD and professionals who work with families of children with ASD. We also developed an automated system that will allow us to deliver the content to parents over the internet. Overall, the focus group input was very positive regarding the content of the program and its ease of navigation of the online system.				
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## Table of Contents

	<u>Page</u>
Introduction.....	4
Body.....	6
Key Research Accomplishments.....	23
Reportable Outcomes.....	25
Conclusion.....	26

## INTRODUCTION

Research indicates that early and intensive intervention can lead to significant improvement in long term outcomes for children with ASD. However, the growing numbers of young children with ASD and their significant educational needs make it a challenge for public agencies to provide services at the needed level of intensity. Parent training is a cost-effective approach to intervention that can improve child outcomes by increasing the number of hours of intervention a child with ASD receives. Parent training has also been shown to decrease parent stress and depression. Although parent training is considered an essential component of early intervention programs for children with ASD, it is rarely provided in community-based early intervention settings due to a lack of appropriately-trained providers. Further, effective parent training programs for children with ASD require frequent parent coaching by a therapist. Thus, the absence of reliable transportation, lack of child care, cost of treatment, and limited flexibility in scheduling, can significantly affect access to these services. These barriers are particularly a problem in rural and underserved areas. The development of more sophisticated technology has created the opportunity for distance learning of intervention strategies. Thus, the objective of this project is to develop and pilot an internet-delivered parent training program for caregivers of children with ASD. The intervention will be based on an evidence-based curriculum that uses a blend of developmental and behavioral intervention strategies during daily routines and activities. In the first phase of the project (Year 1), we will develop the online parent training program. This will require modify an existing evidence-based parent training curriculum to be delivered over the internet in 12, self-administered modules containing the intervention content. In addition, we will determine the best method for providing remote coaching to parents. The development of the online program will be guided by feedback from 2 focus groups with parents, intervention providers, and program administrators. In the second phase of the project (Years 2 and 3), we will formatively evaluate the acceptability, usability and implementation feasibility of two delivery formats of the program to

determine the most effective delivery method and use feedback to further refine the program. We will randomly assign families to receive the self-administered modules only (n=15) or the self-administered modules and remote, video-based coaching from a trainer (n=15). At the conclusion of their participation in the program, parents will complete measures of comprehension of program content and treatment acceptability/satisfaction. We will also assess parent program engagement and parent fidelity of implementation. We expect that the results will reveal that internet-based instruction will be a feasible method for training parents of children with ASD in evidence-based intervention strategies, and will thus disseminate evidence-based practices to underserved populations. If the program is found to be feasible, the next step will be to obtain an R01 to conduct a randomized controlled trial of the intervention to determine its efficacy.

## BODY

The goal for Year 1 was to modify an evidence-based parent training curriculum to be delivered over the internet. The goal for Year 2 was to begin pilot testing the two versions of the program with families. At the end of the first reporting period, we had accomplished many of the proposed tasks for Year 1 outlined in the Statement of Work. However, we decided to make a significant change to the delivery platform for the self-directed portion of the program. This change allowed for much more flexibility in content delivery and the integration of the program elements into a single interface, enhancing usability. However, it required significant programming and beta testing, which put us behind our proposed timeline. Thus, in Year 2, we continued to work on the Year 1 tasks that were not completed by the last reporting period. Program development (Specific Aim 1) is now completed and we have begun enrolling participants for the feasibility trial (Specific Aim 2). Below, we detail our progress on each of these tasks thus far.

***Specific Aim 1: Modify an evidence-based parent training curriculum to be delivered over the internet***

***1a. Create 12, self-administered modules containing the intervention content to be delivered over the internet (months 1-8).*** Curriculum modification will involve: 1) modifying the content of the slide presentations which describes the intervention techniques; 2) developing and recording audio text to accompany the slide presentations; 3) developing comprehension check questions; 4) modifying homework assignments to be consistent with the modules; and 5) developing an online systems training module to help parents navigate the program and upload video.

We have fully designed the curriculum content and modified it to be delivered over the internet in 12 modules. Of note, we have redesigned the content of the slide presentations so that they can be completely self-administered. The published curriculum was designed to be conducted with a parent trainer; thus the original parent materials did not include some key pieces of information since they were provided by the trainer (e.g., theoretical framework of the intervention, how to set goals). The original curriculum included some video examples, but not a sufficient number to facilitate learning in the absence of coaching. Thus, we added a significant amount of additional content to enhance learning

in a self-administered format. This necessitated rewriting the parent manual so that it is consistent with the content of each module. We originally proposed to use an existing software program (B.I. Care – now Behavior Connect) to deliver the online program. Our research suggested that this program was the best one on the market for exchanging video in order to conduct the remote coaching. However, after working with the company for several months, it became apparent that there were a number of things that we wanted our program to be able to do that were not supported by Behavior Connect. This was particularly the case for the self-administered portion of the program. Thus, in March 2011, we began working with computer programmers at Michigan State University to develop our own user interface and data collection system to deliver the self-administered modules. This secure system allows us to track each user's activity so that we can determine how much time is spent on each program element. It also includes digital forms that store the user's responses so that the user can track his or her own progress in the program as well as sends the user's responses to the trainer for use in remote coaching. The pages are also dynamic, so that we can make changes to the program in response to feedback from users during Phase 2 of the project.

We are very confident that our choice to design the remote delivery program ourselves will make the program far more user-friendly. In addition, it gives us much more control over program elements and automatic data collection. The feedback from the two focus groups fully supports this decision; participants were uniformly positive in their opinion of the user interface and its ease of use. In addition, it has allowed us to add several other elements to the self-administered program that we anticipate will enhance program engagement and learning.

Below we detail the development of the self-administered program. Much this work was completed during Year 1. During Year 2, we have worked to finalize all program components, integrate them into the online delivery system, beta test the program and fix the numerous technical problems that arise when developing a new web-based application.

- 1) We modified the content of the slide presentations that describe the intervention techniques so that the program can be completely self-administered. All slide presentations were scripted and additional video examples were selected. We hired a voice-over professional to record the audio text. All recordings were edited and converted to flash video files so that they can stream over the internet.
- 2) We developed comprehension check questions for each module that allow users to check their understanding of the informational content. In addition, we developed video-based exercises that allow users to evaluate their understanding of the implementation of the techniques (users view brief video clips of adults using the intervention and are asked to rate whether they implemented the techniques correctly or incorrectly).
- 3) We modified the homework assignments to be consistent with the modules. In addition, we added reflection questions to help users report on their experience using the techniques with their child.
- 4) We created a “video library” that provides longer video examples (3 to 5 minutes) of adults using the intervention techniques together with children with ASD. The video library allows the user to enhance their understanding of how the different intervention techniques are used together to target a range of social communication skills in children with a wider range of skill levels. These video clips are organized by child language level to allow users to select clips that are most relevant for their child.
- 5) We developed a resources page which contains links to paper versions of the online forms, additional informational websites on autism, and published research on parent training.
- 6) We selected an existing forum program (Yet Another Forum – YAF) to support the moderated, interactive forum in which parents can post and respond to questions and comments about their experience with the program, and have integrated this application into our interface.



***1b. Conduct series of 2 focus groups with parents, intervention providers, and program administrators to obtain information on key elements of the program (months 4-8).*** We will conduct two focus groups with 8-10 key stakeholders to gain feedback on the structural elements of the program. Focus group members will participate in two focus groups, three months apart. In the first focus group, we will obtain feedback on the structure of the online systems training and self-administered modules. In the first focus group, we will obtain feedback on the structure of the online systems training and self-administered modules. In the second focus group, we will present the modifications to the online systems training and self-administered modules that we made in response to feedback from the first group. We will then obtain additional feedback on these modifications. We will also collect feedback on the remote coaching component of the program. Feedback from focus group members will be integrated and incorporated into the final program.

We conducted the first focus group with four professionals and four parents of children with ASD in April 2011. Participants were provided with access to a beta version of one lesson (module) and asked to work through it at home in preparation for the group. During the focus group, participants were asked to comment on the self-administered program. The results from the first focus group were presented in the Year 1 Progress Report. Of note, provider and parent feedback was quite positive regarding the design of the program. Participants also provided a number of comments and suggestions that were incorporated into the full program.

We conducted the second focus group with a subset of the participants from the first focus group in March 2012. Three professionals and one parent participated. A week before the focus group, each participant was sent a link to a beta version of the entire program and asked to work through it at home in preparation for the group. During the focus group, participants were asked to comment on the extent to which they felt that the program would achieve its aims, barriers to using the program, what type of children and families would be the most likely to benefit from the program, and how the program should be disseminated. We also asked participants to comment on the remote coaching portion of the program. Specifically we asked them to comment on any concerns about the use of video conferencing to provide coaching, the appropriate frequency and structure of remote coaching sessions, and the usability of available video conferencing programs. In most cases, professionals and parents were similar in regards to their opinions. Themes brought up during the focus group and interviews are

highlighted below.

The ***participants felt the final self-administered program would achieve its intended aims*** and identified a number of aspects of the program that they liked. They reported that they felt that ***the program was comprehensive***. [Provider]: “From a provider perspective, I feel it is pretty comprehensive for the set of goals you want to achieve. It is nice to see that the library is expanded, the forms are clear, and the manuals are clear. Even if don’t have the coaching it seems relatively comprehensive on its own (even though I haven’t piloted with a family).” They also reported that ***the program was easy to understand***. [Parent]: “As a parent it is comprehensive and logically laid out, and extremely easy to follow.” Participants also indicated that they liked that the program focused on social communication more broadly, not just verbal language, and that the skills targeted were appropriate for very young children. [Provider]: “So many parents are missing the social communicative piece, so I thought it was great you really focused on that.” Participants reported that ***the way the video examples were presented was helpful***. [Provider]: “I like that the video library is broken down by the language level of the child. The descriptions of the videos were very helpful, in that you can see in this video you are doing this and in this other video you are doing that. I thought this was a nice feature.”

Participants familiar with traditional parent training ***liked that parents could review previously presented information that is the most relevant for their child’s developmental level***. “When we go through it sequentially, you don’t go backwards to the previous modules. It is nice to be able to go back and go to where their child is at, rather than feel like they are doing homework that their child may not be ready for yet. You can stay on the module if you need to.” There was a lot of discussion of how the program could help parents work at their child’s current developmental level. Participants liked that parents could view video of children at the same language level as their child as well as children at a higher language level, although there was some concern that viewing children who were more advanced could be demoralizing. [Parent]: “I would say that you can tell the parents to start at the most

appropriate level and then tell them that they can look ahead. Parents compare their child to other children, and it can be difficult if they are seeing other children doing different things and may feel upset. So you want to be sure that parents stay at entry point, but encourage them to look ahead if they would like and with the knowledge that what is shown in the video isn't necessarily what they should be working on."

The group discussed which children and families would be the best fit for this program. The participants indicated that ***this program would be appropriate for a range of children, beyond those with a diagnosis of ASD***. In particular, participants mentioned the program would be appropriate for children with developmental concerns who do not receive a diagnosis of ASD. [Parent]: "They may rule out autism and perhaps end with a speech delay, but they could still be using the program. So the child may have no diagnosis in the end, but you still benefit from using [Impact Online]." They also agreed that the program would be a good resource for families of children who would not qualify for specialized ASD services in the community or who had to wait for services. [Provider]: "If children are too young, not a good match, or waitlisted, this program could work well."

Several providers agreed that ***families whose children had significant behavioral problems would not benefit as much from the program***. The participants also indicated that parent characteristics could also affect the success of the program. One provider indicated that ***the parent's own beliefs about their ability to influence their child's development would be important***: "Success in the program has a lot to do with a parent's desire and belief that change is possible and that change is not going to happen overnight....Parents need to understand what it is and want to do it. That is what determines the fit." However, a parent indicated that while some parents may do better than others, all families would benefit to some degree from the program.

The participants discussed the how the program should be disseminated (e.g., the types of professionals who could recommend the ImPACT Online program to families and where information on

the program could be provided so that parents can access it). Participants indicated that ***pediatricians' or physicians' offices, diagnostic centers, and educational providers would be the most likely professionals to recommend the program to families.*** There was some discussion that information on the program could be given out as part of a packet of resources to families at the time of diagnosis or to families of very young children who are showing some red flags of ASD but who are too young for a formal diagnosis. It was also suggested that that it would be important to have someone who the parent could connect with who knew the program well. [Provider]: "A physician's office would be great if they can recommend it, but then there needs to be someone that that parent can connect with who is really knowledgeable about the program." Participants also indicated that it would be good for educational providers to recommend the program to families who are unable to access parent training services through the schools. [Provider]: "Having this resource as an educational provider is exciting. We have parents coming through all the time, and we miss [providing parent training to] some of them." It was also felt that ***this program would work well as a complement to a more comprehensive intervention program,*** particularly if parents completed the ImPACT Online program first. [Parent]: "This is a nice complement to an ABA program, and if going into an ABA program would give them a lot more information ahead of time. Providers who are doing behavioral interventions could use this."

There was also some ***interest in making information on the program more widely available to parents of children with ASD through resource guides.*** [Parent]: This could be included in the resources in the [State resource] manual. Because the hope is that once the child has a diagnosis, the parent could look at this online as a recommended resource.

The participants identified a number of barriers to parents using the self-administered portion of the program. ***Time was identified as a potential barrier of the self-administered program.*** Several participants indicated that it could be difficult for parents to find the time to complete the program on their own if it wasn't scheduled into their day. [Provider]: "When you have it scheduled as a class they

are committed to it for this amount of time every week, and it may be harder to find time on your own.”

Another participant felt that making time to complete the program would be particularly difficult if the parent had any difficulty understanding the information. [Parent]: “Time is an issue, and if you have multiple kids in the home. It takes time to process this information, and if you come across anything difficult it may seem insurmountable.” ***The potential low cost of the program was also identified as both a potential barrier to completion of the program.*** [Provider]: “Accountability. When you pay for something and sign up you are more likely to do. But they may be a single parent or have four children and there may be life barriers. There needs to be some sort of system like having them pay.”

The participants identified ***access to technology as a significant barrier***, particularly for families with limited resources. [Parent]: “...not having electronic access or having very slow access that couldn’t run the program, and those that are poor that don’t have access at all.” However, they also suggested that the online format would increase access more generally. [Parent]: “...this is going to be the most comprehensive way to reach most people.” Participants also identified a ***potential barrier to the self-administered program would be not having a professional who could help the parent work through any sections that were difficult to understand or help the parent address any significant child behavior problems.*** [Provider]: “We have a lot of parents that have learning disabilities, and we can help them learn the material because we are right there. Online might be a problem in terms of this. You need to think about how are parents getting to this, and within this mode how do we make them most successful.”

The participants suggested a number of ***potential methods that could enhance the success of the self-administered program. These included having parents work with a [behavioral expert] to address child behavior problems prior to completing the program, offering the self-administered program in combination with a regular parent group to increase accountability and social support,***

***and having a local subject matter expert available who could answer parents' questions as they worked through the program.***

Participants discussed the information that would be best to provide during the remote coaching sessions. The participants indicated that parents would want to receive ***feedback on how they were implementing the techniques with their child and how to handle recurrent challenges.*** [Parent]: "They would want to know: Am I doing this right, what am I not doing right, Is this working?" [Provider]: "They may want help with how to deal with recurring situations, like: this happens every time, the child just walks away." The participants also indicated that remote coaching would serve an important social support role for parents. [Provider] "The therapist is also a social support network, and while we are looking for the data, the parent wants the support."

The participants reported that coaches would want to ***help parents improve their skills and prepare them for the next strategies.*** [Provider]: "As a provider you need to be able to push them beyond where they are at just a bit, and should be preparing them for the next steps if they have mastered a level, while also prepping them for the next level. Instead of a scenario where the parent says, I think I have a problem I'll call the coach, there could be set times to prepare them for the content on a regular basis."

Participants indicated that the ***ideal frequency of coaching would range from twice a week to once every 2 weeks,*** depending on the needs of the family. There was also a discussion of providing remote coaching in groups using group video-conferencing to increase the number of families that could be served. One participant indicated that individual coaching could be conducted in 2, 30 minute sessions per week. The first session per week would be a discussion of the lesson with the parent and the second session would be coaching the parent as he or she worked with the child.

Potential ***technical problems with the video-conferencing software were identified as a significant challenge.*** [Provider]: "The technical problems, I can see the parents we have struggling a

lot with this.” This was considered a particular challenge for families in rural areas. The fact that ***the coach would not be able to work directly with the child while the parent observed was considered a barrier***. [Provider]: “Any video program, there are always going to be issues. You can’t model anything for the parents, you just say ‘do this’. You can’t jump in and help them with it.” At the same time, the participants felt that ***increased access to coaching provided remotely would overcome this barrier***.

[Provider]: “You don’t have to deal with transportation though. You are missing the hands on, but it has a wider reach, is less costly, and more convenient. The one con is something that you can deal with.”

The participants also indicated that ***parental discomfort with video-conferencing would be a potential barrier***. [Provider]: “Videoconferencing with someone you don’t know may be hard. Parents have a hard time doing it live even though we know them well.” However, the participants also thought that video coaching might be preferable for some parents. [Provider]: “On the other hand, maybe it is easier if you aren’t right there.” ***The participants discussed several options that might make it easier for parents to receive remote coaching. These included having the parents observe a sample coaching session prior to having their first coaching session, providing coaching over the phone instead of video-conferencing, or providing coaching based on previously recorded videos of the parent and child as opposed to coaching the parents as they interaction with their child.***

At the time, we were considering using Adobe Connect as our video conferencing program; so we did a brief demonstration of the software, and asked participants to comment on its usability. In general, the participants liked the available features of Adobe Connect (screen sharing, group meetings, screen recording). One of the participants had extensive experience using Adobe Connect to do remote supervision. She indicated that there were ***numerous technological problems with Adobe Connect when using the program on home computers***.

**1c. Make refinements to program based on feedback (months 9-12).** We will make final modifications to the program based on feedback obtained from the focus groups. At this point, we will assess whether the program needs to be significantly altered based on feedback from the focus groups. Although we plan to incorporate feedback on the program and assessment protocol throughout this phase of the project, we may find that significant alterations to the delivery format need to be made prior to beginning the pilot study. We will evaluate this possibility at this point and will make adjustments to the timeline accordingly.

We used the feedback obtained from the first focus group to guide the development of the self-administered program. The second focus group was conducted to obtain feedback on the completed self-administered program. Overall, the information obtained from the second focus group was very positive. The participants liked the changes that were made to the program in response to feedback from the first focus group. Participant feedback suggested that final self-administered program would be likely to achieve its intended goals and no additional changes to the content or format of the self-administered portion of program were identified. After the second focus group, we developed the online systems training module (tutorial) and a program introduction designed to help users determine whether the program is appropriate for them and their child (introductory video, system requirements, terms of use, help).

Information obtained from the second focus group was used to inform our protocol for delivering the remote coaching portion of the program. Overall, the information obtained from the second focus group was very encouraging. Although participants felt that traditional live coaching would be the preferred method for working with parents, they agreed that remote coaching using video-conferencing would be beneficial, and the increased access that it would provide would surmount worth any potential limitations. They also offered a number of suggestions for how to make the remote coaching successful. These suggestions were instrumental in our decision of how to conduct the remote coaching portion of the program. Given potential concerns about technology and parent discomfort with video-conferencing, we decided to schedule an initial session in which a coach would come to the parent's home and help the parent register and use the video-conferencing software, prior to



conducting the first coaching session. During the discussion of the ideal frequency and format of the coaching sessions, it was proposed that the remote coaching sessions be conducted in 2, 30 minute sessions per week. The first session per week would be a discussion of the lesson with the parent and the second session would be coaching the parent as he or she worked with the child. After discussion, there was general consensus that this would be beneficial, thus we chose to adopt this coaching model. When discussing the Adobe Connect video-conferencing program, one participant who had extensive experience with it indicated that it has numerous technological problems when used on home computers. This information made us reconsider its use. After piloting several programs, we decided to use Skype as our video conferencing program instead. This decision was made due to its ease of use and the fact that individuals are likely to be more familiar with Skype than other similar programs due to its length on the market.

We have piloted the self-administered plus remote coaching version of the program with one family (see information below). Based on ongoing feedback obtained from this parent, we corrected program “bugs” and made small modifications to program content to increase clarity. The resulting program is now ready for use in the feasibility trial.

***Specific Aim 2:*** Formatively evaluate the acceptability, usability and implementation feasibility of two delivery formats of the program to determine the most effective delivery method and use feedback to further refine the program

***2a. Recruit participants (months 9-30).*** We will begin recruiting families to participate in the pilot study in month 9 of the project. We will aim to recruit 35 families with the expectation that some will not qualify or will choose not to participate. This will allow us to pilot a minimum of 15 families for each delivery format. Although we do not anticipate difficulty with participant recruitment, at this point in the study, we will examine our ability to recruit a sufficient number of families to complete the proposed study. If we find that we are having difficulty recruiting the anticipated number of families, we will change our recruitment strategies to include families living further from the research site and by connecting with additional agencies.

We began recruiting participants for this study in March 2012 with an anticipated study enrollment date of September 2012. This strategy allowed us time to determine whether our

recruitment strategy would be sufficient for recruiting the proposed number of participants, while also providing us time to work out any additional issues with the technology involved in the program that arose during our pilot testing, prior to enrollment. Our response rate has been good. As of September 2012, we had 17 potentially eligible families contact the lab about participation in the project. This suggests that our recruitment strategies are working as intended and we anticipate that we should be able to enroll the projected number of participants over the course of this project.

***2b. Conduct intake assessments and have families use and evaluate one of two delivery formats (months 12-33).*** We will conduct intake assessments for 30 families to collect demographic information and ensure participants meet inclusion criteria. Half of the families (15) will receive the self-administered modules only. The other half of the families will receive both the self-administered modules and remote, video-based coaching from a trainer. At the conclusion of their participation in the program, parents will complete measures of comprehension of program content and treatment acceptability/satisfaction. We will also assess parent program engagement and parent fidelity of implementation. These measures will be used to determine program acceptability, usability, and implementation feasibility.

In April 2012, we enrolled one family in the self-administered program plus coaching program (Coaching) in order to pilot the intake assessment protocol, the remote coaching protocol, and to identify any technical issues with the self-administered program or the video-conferencing software used to conduct the remote coaching. The family completed the program in September 2012. The parent's individual results are reported below. We have now enrolled our first cohort of five families in the feasibility trial. Their intake assessments have been completed and they have been assigned to conditions based on the proposed random assignment protocol. We have begun to recruit a second cohort of participants with the aim of conducting intake assessments in November 2012.

Comprehension of Program Content: Comprehension of the program content and gains in parents' intervention knowledge were measured through correct answers to the comprehension self-check questions and video-based exercises within each lesson and a 20-item, multiple-choice *Intervention Knowledge Quiz* that assessed curricular content administered at pre- and post-treatment. The parent answered 96% of the self-check questions correctly and 93% of the exercises correctly across

lessons, suggesting that he understood the majority of information presented in the lesson. On the *Intervention Knowledge Quiz*, the parent answered 65% of the questions correctly at pre-treatment and 95% of the questions correctly at post-treatment, suggesting a substantial increase in his knowledge of key intervention concepts.

Treatment Acceptability/Parent Satisfaction: The acceptability of the intervention procedures and the online delivery format of ImpACT Online program and the parents' overall satisfaction with the program were measure using a modified version of the Behavioral Intervention Rating Scale (BIRS; Elliott and Trueting, 1991) completed at post-treatment. The BIRS is a well-validated measure that asks individuals to endorse 19 items that assess the acceptability of a treatment's procedures and its perceived effectiveness on a 6-point scale, ranging from 1 (highly disagree) to 3 (neutral) to 6 (highly agree). The BIRS was modified to better reflect the goals of the current intervention (i.e., acquisition of social-communication skills). Parents were also asked to rate 13 additional items that assessed the helpfulness of each component of the web-based program for learning the intervention and overall satisfaction with the program. Parents receiving the remote coaching component of the program are also asked to endorse 5 additional items that assessed parent satisfaction with the remote coaching and their relationship with their coach. All parents are also asked to make open-ended comments about benefits and limitations of the program and suggestions for improvement.

The parent rated the intervention's procedures as highly acceptable and effective (Average rating of 5.16 out of 6). The parent also rated self-administered program (Average rating of 4.80 out of 6) and the remote coaching (Average rating of 6 out of 6) portions of the program highly in regards to how helpful they were for learning the ImpACT intervention. He also rated the coach highly in terms of her interest and understanding of him and his child (Average rating of 5.7 out of 6), suggesting that conducting coaching remotely did not adversely affect the relationship between the parent and coach. His rating of his overall satisfaction with the program was a 6 out 6. On the open-ended comments, the

parent indicated that the program helped teach him methods to promote his son's skills: "The program helped provided methods to get Jack engaged and help teach him better communication skills. Jack made many noticeable improvements in his social and language development over the course of the program. He is using more descriptive words and longer sentences as well as engaging in play/interactions for longer periods of time and answering questions better." The limitation that the parent identified was the amount of time required to implement the program: "The amount of time required to complete the program can be difficult to invest. It does take a fair amount of time to implement the program." Overall, these treatment acceptability and parent satisfaction ratings are similar to ratings of that we have received for live versions of this program (e.g., Ingersoll & Wainer, in press).

Parent Program Engagement: Parents' use of the different components of the self-administered program was used to measure parent program engagement. Parent login times, movement through the program, number of lessons and lesson components completed (i.e., self-check questions, exercise, homework plans, reflection questions), and number of additional program elements accessed (i.e., video library, forum, resources) were tracked electronically within the program. The number of remote coaching sessions completed by the parents in the remote coaching group was also tracked. Between May 6 and September 9, 2012, the parent logged into the ImPACT Online program 26 times to complete the self-administered portion of the program. He spent an average of 34 minutes per login (range=1 min to 1 hr:24 min) for a total program engagement time of 14 hrs:55 min. He completed all lesson and all components within each lesson in the recommended order, although he occasionally reviewed earlier material in the program. The parent completed 100% of the lessons (12) and 100% of each of the lesson components. Each lesson took on average 1 hour and 14 minutes to complete. The parent frequently completed the self-administered program between 9pm and 1am. The parent also completed 100% of the remote coaching sessions (24). Coaching sessions took 29 minutes on average to complete.

Parent Fidelity of Implementation: The accuracy of the parents' use of the intervention techniques with their child was measured during a 10-minute parent-child play session and a snack in the home conducted at pre-and post-treatment using the Project IMPACT intervention Fidelity Checklist. For parents in the remote coaching group, the parents' use of the intervention with their child during weekly coaching sessions was also monitored for fidelity by the coach using the Fidelity Checklist. Parents are given fidelity ratings on a 5-point scale in five areas: Makes Play Interactive, Models and Expands Language or Play, Increases Opportunities for Initiations, Helps Increase the Complexity of Language, Imitation, or Play, and Paces the Interaction. An Overall Fidelity score is calculated by averaging scores across the five fidelity categories. An overall fidelity rating of 4 or greater is the standard for meeting fidelity of implementation. The parent received an average fidelity rating of 1.5 across the two observations at pre-treatment and an average fidelity rating of 4.2 across the two observations at post-treatment, indicating a substantial increase in his appropriate use of the intervention techniques. The parent's post-treatment average fidelity rating of 4.2 demonstrated that he met fidelity of implementation for the intervention at post-treatment.

Several minor technical problems were identified during piloting (e.g., problems with sound quality during remote coaching, difficulty with the screen-recording software, problems with the program's recording of users' responses). These issues were resolved. In addition, minor changes were made to the program's content based on the parent's feedback to enhance clarity. In addition, the use of Skype to provide remote coaching was found to be feasible, although several modifications to the coaching protocol used during live coaching had to be made. For example, instead of giving ongoing feedback to the parent while he interacted with the child, the coach had to alternate between observing the interaction, and then providing feedback to the parent while the child played alone so that the parent could hear the coach's feedback. Several minor technical problems with Skype were also identified during piloting (e.g., dropped calls, screen freezing); however, these problems were also





### KEY RESEARCH ACCOMPLISHMENTS

- We completed the development of the self-administered program (ImPACT Online).
- We conducted second focus group to receive feedback on the completed self-administered program and to obtain information on how to conduct the remote coaching sessions.
- Key themes identified from the focus group included: 1) The program would likely achieve its aims; 2) the program would be appropriate for a range of families; 3) children with significant behavioral difficulties and parents who do not believe that they can help their child gain skills may not benefit as well as others; 4) pediatricians' or physicians' offices, diagnostic centers, and educational providers would be the most likely professionals to recommend the program to families; 5) limit parental time, accountability, access to technology, and lack of having a professional help the parent through the program could be barriers to the use of self-administered program; 6) having parents work with a behavioral expert to address child behavior problems prior to completing the program, offering the self-administered program in combination with a regular parent group to increase accountability and social support, and having a local subject matter expert available who could answer parents' questions as they worked through the program could address these barriers; 7) technical difficulties with video-conferencing software, parental discomfort with video-conferencing, and not having the coach be able to work directly with the child while the parent observed could be barriers to the use of remote coaching; and 8) having parents observe a sample coaching session prior to having their first coaching session, providing coaching over the phone instead of video-conferencing, or providing coaching based on previously recorded videos of the parent and child as opposed to coaching the parents as they interact with their child could address these barriers.
- We had a pilot participant complete the self-administered program with remote coaching to pilot the full program.



- Data from the pilot participant indicated: 1) good parent comprehension of the session content and substantial improvement in parent understanding of key intervention concepts from pre- to post-treatment; 2) a high rate of parent program engagement; 3) substantial improvement in the parent's fidelity of implementation of the intervention from pre- to post-treatment; and 4) high parent treatment acceptability and satisfaction ratings for the program content, online delivery format, and the remote coaching.

## REPORTABLE OUTCOMES

My lab has conducted one presentation and published one article based on this project during the reporting period.

Wainer, A., & Ingersoll, B. (2011, October). An internet-based program to disseminate training in evidence-based autism intervention. Poster presentation at the Annual National Outreach Scholar Conference, East Lansing, MI.

Wainer, A. & Ingersoll, B. (in press). Using an internet-based training program to disseminate naturalistic behavioral techniques to individuals working with young children with autism. *Journal of Autism and Developmental Disorders*.

We have developed the ImPACT Online program. We plan to use the program in additional research projects that can examine issues of program reach for which we have received IRB approval. We also recently submitted a grant to the Institute Education Sciences in collaboration with researchers at Rady Children's Hospital in San Diego (PI: Stahmer) that would adapt the program content for use with toddlers with ASD. The ImPACT Online program would be used to present training in the intervention to *providers* who would then use the program with parents of toddlers with ASD. In addition, we developed a web-based application to present the ImPACT Online program. This application can be easily modified to present different material. We are currently using the application to deliver a different evidence-based parent training intervention for young children with autism (Online RIT), as part of a separate research project that is supported by a mentor-based fellowship from Autism Speaks. We have also submitted a grant to Organization for Autism Research to examine the benefit of video-enhanced social skills group instruction for school-aged children with ASD. If funded, that project would utilize a modified version of the web-based application to present video models of social skills to school-aged children with ASD as part of a social skills intervention.

## CONCLUSION

This project uses a newly-developed technology to disseminate an evidence-based parent-training intervention for children with ASD. Internet-based instruction is low cost and has the potential to surmount many barriers to participation in traditional parent training programs, including transportation and access difficulties, time limitations (internet-based instruction can be completed at any time of day), and lack of childcare. These aspects are likely to enhance the dissemination of effective intervention strategies to parents of children with ASD. Parents' use of these strategies can greatly increase the number of hours of evidence-based intervention their children receive and lead to increased generalization and maintenance of skills, positively impacting long-term functioning. We anticipate that the program will also have positive effects on parent mental health. Improvement in parent feelings of competence and child functioning will lead to increases in parents' optimism about their ability to influence their child's development and decreases in stress and depression.

Our focus group work suggests that parents and professionals will find the self-administered program highly engaging and easy to use, but that there may be some barriers to parent use, particularly if the program is not accompanied by in vivo or remote coaching. In the second phase of our research, we have begun to examine the feasibility of this program for teaching parents intervention techniques. Our pilot data thus far suggest that the self-directed program in combination with remote coaching is highly feasible and leads to improvements in parent skill. As we collect data with additional participants, we will be able to compare the feasibility of the self-administered component of the program alone compared to the self-administered program plus remote coaching from a professional. This information will provide much needed information on the most effective methods for distributing the intervention to parents. If this approach to parent training is successful, it has implications for a wide range of remote training opportunities, including provider training, which will enhance the availability of high quality and efficacious intervention in areas which are currently underserved.